

- a. combining hydrogen-containing gas with a liquid hydrocarbon stream containing less than 3 wt % sulfur as organic sulfur compounds to form a feed stream;
  - b. passing said feed stream over a monolithic catalyst bed containing hydrotreating catalyst components to convert organic sulfur compounds to hydrogen sulfide and produce a treated hydrocarbon effluent;
  - c. separating the treated hydrocarbon effluent from a sour gas containing the hydrogen sulfide,
  - d. wherein the separated, treated liquid hydrocarbon is a diesel fuel contains less than about 5000 wppm sulfur.
- 

19. The method for making low-sulfur diesel fuel as described in claim 18, wherein said diesel fuel product contains less than about 15 wppm sulfur.

20. The method for making low-sulfur diesel fuel as described in claim 18, wherein said monolithic catalyst bed has a honeycomb configuration.

21. The method for making low-sulfur diesel fuel as described in claim 18, wherein said hydrotreating catalyst components are from the group of cobalt, molybdenum, nickel, tungsten, and phosphorous.

C<sub>3</sub>  
22. The method for making low-sulfur diesel fuel as described in claim 18, wherein the superficial liquid linear velocity is greater than about 0.02 cm/s, the feed hydrogen gas to liquid feed volume ratio is greater than about 10 NL/L, the liquid hourly space velocity is greater than about  $0.1 \text{ h}^{-1}$ , the reactor pressure is greater than about 1 bar, and the reaction temperature is greater than about 200°C.

23. The method for making low-sulfur diesel fuel as described in claim 22, wherein the feed hydrogen gas to liquid feed volume ratio is greater than about 50 NL/L, the liquid hourly space velocity is greater than about  $0.7 \text{ h}^{-1}$ , the reactor pressure is greater than about 20 bar, and the reaction temperature is greater than about 250°C.

---

C<sub>3</sub> 24. The method for making low-sulfur diesel fuel as described in claim 22, wherein the superficial liquid linear velocity is greater than about 0.2 cm/s.

---

25. A method for increasing one-pass heteroatom conversion in a hydrotreating reactor while maintaining hydrotreating selectivity, comprising:

- C<sub>4</sub>
- a. combining hydrogen-containing gas with a liquid hydrocarbon stream containing sulfur, nitrogen, metal or oxygen heteroatoms to form a feed stream;
  - b. passing said feed stream over a monolithic honeycomb catalyst bed containing hydrotreating catalyst components to react the heteroatoms with hydrogen;
  - c. said monolithic honeycomb catalyst bed having a cell density greater than about 10 cpsi and channel opening diameters greater than about 0.1 mm;
  - d. wherein the superficial liquid linear velocity of said feed stream is greater than about 0.02 cm/s, the feed hydrogen gas to liquid feed volume ratio is greater than about 10 NL/L, the liquid hourly space velocity is greater than about 0.1 h<sup>-1</sup>, the reactor pressure is greater than about 1 bar, and the reaction temperature is greater than about 200°C;
  - e. and wherein the one-pass conversion of the targeted heteroatom is greater than 50% with comparable product and feed distillation points.
- 

27. The method for increasing one-pass heteroatom conversion in a hydrotreating reactor while maintaining hydrotreating selectivity as described in claim 25, wherein the superficial liquid linear velocity is greater than about 0.2 cm/s.

C<sub>5</sub> 28. The method for increasing one-pass heteroatom conversion in a hydrotreating reactor while maintaining hydrotreating selectivity as described in claim 25, wherein the feed hydrogen gas to liquid feed volume ratio is greater than about 50 NL/L, the liquid hourly space velocity is greater than about 0.7 h<sup>-1</sup>, the reactor pressure is greater than about 20 bar, and the reaction temperature is greater than about 250°C.

29. The method for increasing one-pass heteroatom conversion in a hydrotreating reactor while maintaining hydrotreating selectivity as described in claim 25, wherein at least

C5 70% (vol.) of the product stream has a D86 distillation temperature range falling within the D86 distillation range of the feedstock.

---

C6 30. The method for increasing one-pass heteroatom conversion in a hydrotreating reactor while maintaining hydrotreating selectivity as described in claim 25, wherein said one-pass conversion of the targeted heteroatom is greater than 80%.

31. The method for increasing one-pass heteroatom conversion in a hydrotreating reactor while maintaining hydrotreating selectivity as described in claim 25, wherein said one-pass conversion of the targeted heteroatom is greater than 90%.--

---

Add the following new claims:

--36. A hydrotreating process for removing from a hydrocarbon feed stream in excess of 50% of the weight of sulfur present in that feed stream in a single pass through a monolith reactor, the feed stream having a boiling temperature range within the range of 70-700°C, which comprises the steps of:  
passing the feed stream and a hydrogen-containing gas through the reactor at a liquid superficial linear velocity in the range of about 0.1 to about 10 cm/s, a ✓  
hydrogen-containing gas-to-liquid volume ratio of about 10-2000 NL/L, a reaction temperature in the range of 200-500°C, a reactor pressures in the range of 100-2000 psig, and a liquid hourly space velocity (LHSV) in the range of 0.1 - 500 h<sup>-1</sup> to provide a hydrocarbon product stream. --

--37. A method in accordance with claim 36 wherein the hydrocarbon feed stream is a refinery or petrochemical liquid streams selected from the group consisting of petroleum distillates, gas oils, and gasoline blendstocks. --

--38. A method in accordance with claim 36 wherein the hydrocarbon product stream is a diesel fuel product containing less than 5000 wppm sulfur, and

wherein at least 70% (vol.) of the diesel fuel product has a D86 distillation temperature range falling within the D86 distillation range of the hydrocarbon feed stream.--

--39. A method in accordance with claim 36 wherein in excess of 90% of the sulfur present in the feed stream is removed in a single pass through the reactor, and wherein: the liquid superficial linear velocity is in the range of 0.5 to about 5 cm/s, the hydrogen-containing gas-to-liquid ratio is in the range of 50-300 NL/L, the reaction temperature is in the range of 250 to about 400°C, the reactor pressure is in the range of 300-1000 psig., and the liquid hourly space velocity is in the range of 0.5-50 h<sup>-1</sup>.--